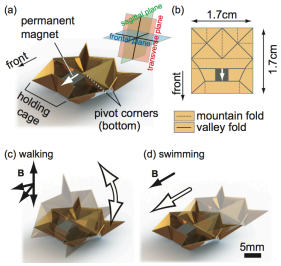
DOGOnews
Fodder for young minds

Tiny Origami Robot Runs, Climbs, Lifts Loads, And Even "Self-Destructs" Once Job Is Done

By *Allegra Staples* on July 28, 2015

Often the most incredible **innovations** come in the tiniest packages. That is certainly true for the origami robots created by some Massachusetts Institute of Tech (MIT) researchers. The microbots that made their **debut** earlier this summer at the International Conference on Robotics and Automation in **Seattle,** WA, are r adorable. They also possess skills that may come in handy to **combat** human **ailments**.

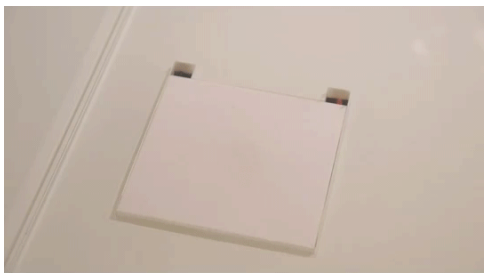
What's interesting is that the **minuscule** robot which sits about 1.5 centimeters tall and weighs one-third of a gram has no complicated machinery. MIT graduate s Cynthia R. Sung, co-developer of the robot says unlike traditional robots, all these motions are "**embedded** into the **mechanics** of the robot body." This means does not need external "legs," motors, or other movement-enabling **appendages** to be mobile.



In fact, the **blueprint** of the robot is surprisingly straightforward. Its only **components** are some self-folding sheets and a tiny **neodymium** magnet. But don't simple design fool you. This simple microbot can walk, swim, climb, and even overcome **obstacles**, all while carrying a load twice its weight. While that may ap be almost magical, the robot's talents are rooted in scientific principles.

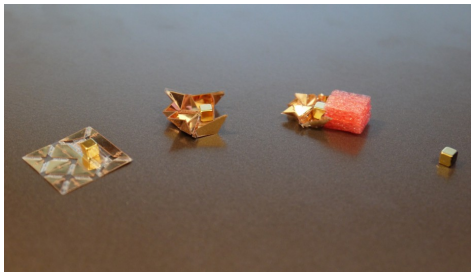
Its amazing self-folding powers can be **attributed** to the sheet of polyvinyl chloride embedded within each of the several **prototypes** created by its inventors to f **optimal** material. The commonly found plastic contracts when **subjected** to temperatures of about 150° F.

Hence when the flat sheets are exposed to heat they fold up, enabling the robot to "come to life." Once that happens the tiny magnet attached to the back take by connecting with external magnetic fields. The scientists control the microbot's movements by applying the magnetic fields in varying **sequences**.



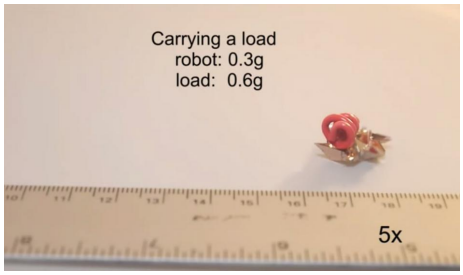
For example, one course would **entail** lifting the robot's back "feet" off the ground while the front stayed **adhered** due to friction. The next sequence causes the b twist, lifting the front feet off the ground and **propelling** the bot forward, as if it were walking. By alternating these magnetic fields, the robot can be moved in a of ways.

In experiments, the robots were tested on a rectangular stage with strong electromagnets positioned in all four corners. This allowed the researchers to chan **electromagnetic** fields rapidly enough to enable the microbot to move about four body lengths per second.



To ensure the robot **consistently** folded in the required form, the scientists cut slits of varying widths into the outer layers of the self-folding material used. Wh sheet was exposed to heat, the middle layer contracted, forcing the narrower slit's edges together causing it to bend in the opposite direction. If another for desired, the researchers merely exposed the material to a slightly lower or higher temperature, which in turn would cause the folds to contract in a totally differen

What's even cooler is that the prototypes were made from liquid soluble materials. One whose outer layers comprised of **polystyrene** dissolved completely dunked in an **acetone** solution. Another was water soluble. The robot's ability to "self-destruct" is of utmost importance. That's because the **hypothetical** use of t bot is to heal humans by zapping cancer cells, cleaning **clogged** arteries, or sensing foreign materials.



In theory, robots even tinier than these would be **injected** inside the human body in their flat form and transported to the area requiring care via the blood stream there, the microbots would come to life using a yet to be determined heat source, complete their mission, and then simply dissolve.

Shuhei Miyashita, a **post-doctoral** student involved in the robot's development notes that with the **innovative** design, "we complete the cycle from birth throu activity, and the end of life." The scientists clearly have more work to do before the origami robot is ready for human use. However this is certainly a step in th direction.

Resources: newsoffice,mit.edu, spectrum.iee.org, newscientist.com

Vocabulary

acetone **adhered** **ailments** **appendages** **attributed** **blueprint** **clogged** **combat** **components** **consistently** **debut** **electromagnetic** **embedded** **entail** **hypothetical** **injected** **innovations** **innovative** **mechanics** **minuscule** **neodymium** **obstacles** **optimal** **polystyrene** **post-doctoral** **propelling** **prototypes** **sequences** **subjected**

Geography

Seattle, WA